

ABSTRACT

The present invention relates to controlling the properties of semiconductor materials at the atomic or molecular level to achieve improved performance within semiconductor devices. Further, the invention relates to the identification, creation, and use of improved materials for use in the conduction paths of semiconductor devices. More specifically, the inventors have identified materials or structures having energy band structures in which the average curvature of the conduction and valence bands and band edges is substantially greater than the average curvature of conduction and valence bands in single crystal silicon. This substantially greater curvature corresponds to lower effective mass and, hence, greater carrier mobility. The disclosed semiconductor structures have one or more atomic layers of an (non-semiconductor) element or compound other than a semiconductor which are interposed between layers of a semiconductor to increase the average curvature of the valence and conduction bands and improve the carrier mobility of the semiconductor structure.